ments overlapped (Fig. 1). The maximum length of *P. boughtoni* (range = 380–500 μm) fell below the range of larvae of *Protostrongylus* spp. from bighorn sheep (527–673 μm), but overlapped with that of *O. macrotis* (488–611 μm). Also, maximum length of *O. macrotis* overlapped with the range of *Protostrongylus* spp. from bighorns. Therefore, where the three definitive hosts are sympatric, only infective larvae in the extremes of the total length range for all species can be identified with confidence. Larvae of *P. boughtoni* can be distinguished from those of *Protostrongylus* spp. from bighorns if there is no possibility of *Orthostrongylus* larvae occurring in a sample.

Although total length is not the most consistent morphologic basis on which to separate species of helminths, such a method is attractive in its simplicity and adaptability to field studies. Third-stage larvae of some species in the confamiliar genus *Parelaphostrongylus* differ in tail structure (Ballantyne and Samuel, 1984, J. Parasitol. In press). Specific structural differences may be found among *Protostrongylus* and *Orthostrongylus* infective larvae, but rapid examination of fine morphological details is prevented by the nearly opaque first-stage cuticle. Removal of this cuticle without damaging the larva inside, though not impossible, is extremely difficult and time-consuming.

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Skrjabingylus chitwoodorum Hill, 1939 (Nematoda: Metastrongyloidea) in Striped Skunks from Northcentral Minnesota

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The nematode *Skrjabingylus chitwoodorum* occurs in the frontal sinuses of striped skunks (*Mephitis mephitis* Schreber) and causes progressive deformation of the frontal region of the cranium. The frequency of lesions and degree of deformation were related to relative age and geographic distribution of skunks (Kirkland and Kirkland, 1983, Can. J. Zool. 61: 2913–2920). There are, however, no published accounts relating skull lesions to actual ages of striped skunks, nor is there documentation of how numbers of worms relate to age and degree of deformation. This note presents age-specific documentation of prevalence of lesions and numbers of adult *S. chitwoodorum* in the frontal sinuses of striped skunks from a forested region in northcentral Minnesota.

Skunks were collected in the northeastern portion of Itasca County, Minnesota (47°52′N, 93°22′W). In Grand Rapids, 50 km southwest of the study area, mean January temperature is −14 C, and in July the mean is 19 C (U.S. Dept. Commerce, unpubl. data). Snow cover is usually present from December through early April, and during the winters of 1970–1971 through 1982, mean January–March snow depth was 46 cm. Total annual precipitation averages 29.9 cm.

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TABLE 1. Age-specific cranial damage to striped skunks in northcentral Minnesota caused by *Skrjabingylus chitwoodorum*.

Age (yr)	*n*	Cranial damage class 0	1	2	3	% With class 2 or 3 damage
0.5[a]	21	19	2	0	0	0.0
1.0–1.5[a,b]	24	2	18	2	2	16.7
2.0–2.5[b]	26	1	9	12	4	61.5
≥3.0	17	0	4	7	6	76.5

[a] Distribution within cranial damage classes (0 vs. 1–3) significantly different ($\chi^2 = 30.36$, 1 df, $P < 0.001$).

[b] Distribution within cranial damage classes significantly different ($\chi^2 = 11.08$, 3 df, $P < 0.02$).

TABLE 2. Numbers of *Skrjabingylus chitwoodorum* in frontal sinuses of six male striped skunks collected in northcentral Minnesota.

Age (yr)	Cranial damage class	Total no. of worms	% Male worms
0.5	1	25	48
2.0	2	97	45
2.0	2	111	50
3.0	2	116	59
3.5	1	61	57
3.5	3	381	64

Vegetation in the study area is mostly boreal coniferous/deciduous forest (Maycock and Curtis, 1960, Ecol. Monogr. 31: 1–35). Uplands are dominated by aspen (*Populus* spp.), balsam fir (*Abies balsamea* L.), paper birch (*Betula papyrifera* Marshall), and jackpine (*Pinus banksiana* Lambert); black spruce (*Picea mariana* Miller), tamarack (*Larix laricina* DuRoi) and black ash (*Fraxinus nigra* Marshall) are common in lowland areas.

Skunks were captured incidentally in traps set for wolves (*Canis lupus* L.) during spring (April–May) and fall (August–September) 1981–1983. Body weights and measurements were recorded, and skulls, reproductive tracts and stomachs were collected. Skulls were boiled so that they could be measured and canine teeth extracted. Cranial damage was assigned to one of four categories, with class 0 indicating no noticeable damage and class 3 indicating gross deformation of the frontal region accompanied by perforations or erosion of the frontal bones (Kirkland and Kirkland, 1983, op. cit.). Since most skulls were boiled before cranial damage caused by *S. chitwoodorum* was recognized, an additional sample of skulls was examined before boiling. These skulls were dissected and nematodes from frontal sinuses were counted and measured. Canine teeth were radiographed and skunks <10 mo old identified (Fredrickson, 1983, Wildl. Soc. Bull. 11: 297–299). Older individuals were aged by counting cementum annuli (Casey and Webster, 1975, Can. J. Zool. 53: 223–226).

A sample of *S. chitwoodorum* was measured to confirm species identification (Lankester, 1983, Can. J. Zool. 61: 2168–2178). Total length of female worms averaged (±SD) 36.4 ± 5.1 mm (range = 28–48 mm, *n* = 27) vs. 19.4 ± 3.4 mm (range = 13–26, *n* = 23) for males. Mean spicule length was 763 ± 50 μm (range = 690–815, *n* = 7). Both male and female worms averaged larger than those described originally by Hill (1939, J. Parasitol. 25: 475–478) in Oklahoma, were similar to worms from skunks in Illinois (Levine et al., 1962, Ill. Acad. Sci. Trans. 55: 3–5) and New York (Goble, 1942, J. Mammal. 23: 96–97), and smaller than worms found in Ontario (Lankester, 1983, op. cit.). Representative specimens have been deposited in the U.S. National Parasite Collection (Beltsville, Maryland 20705, USA) (Accession No. 78245).

A total of 88 skulls was examined (46 male, 42 female), seven of which (all males) were dissected to collect whole worms. There were no statistical differences ($P > 0.16$) between the sexes in age-specific cranial damage, but damage did increase with age (Table 1). Only 10% of 21 skunks 0.5 yr old had noticeable cranial damage due to *S. chitwoodorum*, but all

17 skunks ≥3.0 yr old had damage, and most was moderate to severe.

The total number of worms extracted from skulls of six male skunks was correlated significantly with cranial damage class ($r^2 = 0.80$, 4 df, $P < 0.05$) (Table 2). Older skunks tended to have a higher proportion of male worms (weighted $r^2 =$ 0.64, 4 df, $P = 0.06$).

Increased numbers of worms and more severe cranial damage were associated with older skunks, probably resulting from the progressive accumulation of worms over time (Kirkland and Kirkland, 1983, op. cit.). Kirkland and Kirkland (1983, op. cit.) found an average of 70–75% of skulls of adult skunks from across North America exhibited lesions (vs. 25–30% of non-adults), and that rates of damage were highest in regions of high precipitation. These phenomena may be related to the mode of transmission of *Skrjabingylus* spp., since terrestrial gastropods are an obligate intermediate host whose abundance and distribution varies directly with environmental moisture.

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Renicola lari Timon-David, 1933 from the Osprey, *Pandion haliaetus* (L.), from Alberta, Canada

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Adult Digenea belonging to the genus *Renicola* parasitize the kidneys of birds frequenting marine or brackish waters (Martin, 1982, Proc. Helminthol. Soc. Wash. 49: 19–21). Life cycles have been described by Stunkard (1964, Biol. Bull. 126: 467–489), Werding (1969, Mar. Biol. 3: 306–333), Martin (1971, Trans. Am. Microsc. Soc. 9: 188–194), and Prevot and Bartoli (1978, Ann. Parasitol. (Paris) 53: 561–575).

On 24 July 1983, a female osprey, in poor physical condition, was found in the Chain Lakes area in Alberta, Canada (50°15′N, 114°13′W) by personnel of the Fish and Wildlife Division and taken to the Calgary Zoo for hospitalization. The bird died of avian cholera (*Pasteurella multocida*) on 7 September, and was submitted to the Veterinary Laboratory, Animal Health Division, Airdrie, Alberta for examination. The kidneys were removed at necropsy and preserved in 10% buffered formalin. Portions of kidney tissue were prepared for histological examination and the remainder dissected. Histological examination of kidney tissue revealed multiple cross-sections of trematodes (Fig. 1). The trematodes were normally present in pairs within dilated kidney tubules lined by cuboidal cells. In

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